



NORWEGIAN MINISTRY
OF EDUCATION AND RESEARCH

Meld. St. 18 (2012–2013) Report to the Storting (White Paper) Summary

Long-term perspectives – knowledge provides opportunity





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Contents

1	Introduction	5
2	Long-term perspectives	7
3	Knowledge provides opportunity	9
4	Internationalisation of Norwegian research	13
5	Norway as a research nation	16
6	Key measures	21

Long-term perspectives – knowledge provides opportunity

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Summary

1 Introduction

The Norwegian Government has high aspirations for research and higher education. In the view of the Government, Norwegian research is of high quality and the Norwegian research system functions well. However, there is still potential to:

- further enhance the quality of research and establish more world-class research and educational environments;
- lay a better foundation to encourage innovative thinking and renewal within the research system and in the development of the private and public sectors;
- increase internationalisation in parts of the research system and ensure more effective coordination in the use of national and international policy and funding instruments;
- promote greater cooperation on the development and application of knowledge.

The Government will continue to pursue the objectives from the previous white paper on research, Report No. 30 (2008–2009) to the Storting, *Climate for Research*.¹ Research policy will still be targeted towards five strategic objectives in which research will be used to

¹ http://www.regjeringen.no/upload/KD/Vedlegg/Forskning/climate_for_research_final.pdf

meet global challenges in the areas of the environment, climate change, oceans, food safety and energy in particular; to achieve good health, reduced social inequalities in health, and high-quality health and care services; to support research-based welfare policy and professional practice in the welfare services; to promote a knowledge-based industrial sector in all regions of the country; and to encourage industrial development in areas relating to food, the marine sector, the maritime sector, tourism, energy, the environment, biotechnology, ICT and new materials/nanotechnology. To succeed, Norway will need to have a well-functioning research system, research of high quality, a high degree of internationalisation in research, and effective utilisation of research resources and results.

The long-term objective set out in *Climate for Research* to achieve an overall investment in research constituting three per cent of GDP remains unchanged. Further, it is the Government’s objective that public allocations to research should equal roughly one per cent of GDP, i.e. approximately one-third of the target for the total amount of investment in research and development.

The Government stresses that educational quality plays an important role in the ability of society to adapt and innovate. The need for high-quality higher education, together with the need for good and relevant skills, will therefore be more clearly integrated into the Government’s research policy in the years to come.



Figure 1.1 Research policy objectives

2 Long-term perspectives

The Government will continue to increase allocations to research in the coming years. This growth will help to realise the nine objectives for Norwegian research policy while at the same time encouraging industry to increase its R&D investments.

It is crucial that investments in research and higher education are long-term, coordinated and given clear priorities. The Government will therefore launch an effort to develop a long-term national plan for research and higher education. The long-term plan will set out political priorities for research and higher education in a 10-year perspective, and the priorities will serve as a guidepost for investments in buildings, research infrastructure, fellowships and expanded student enrolment capacity. The long-term plan will be a tool for targeting efforts towards areas in which Norway has a strategic advantage. By the same token, the plan will provide latitude for innovative, pioneering research that may lead to fundamental new understanding. The plan will have a timeframe of 10 years and be updated every four years. The Government aims to present the first long-term national plan for research and higher education in 2014.

The long-term plan will be structured around a set of clearly-defined objectives, and will specify the Government's overall knowledge policy objectives along with secondary objectives indicating how much the Government believes can reasonably be achieved during the plan's timeframe, in light of the available resources and overall priorities. The Government will set clear targets for Norway's performance in relation to key indicators used to classify the state of Norwegian higher education and research, such as the number of R&D work-years per 1 000 employees, the proportion of the population with a higher education, R&D investments per capita, R&D investments

related to mainland GDP², innovation in trade and industry, and trends in publication and citation frequency.

The long-term plan will ensure a long-range perspective as well as more predictability and transparency with regard to national investments in R&D and higher education. The Government will work to promote an active public debate on investment in higher education and research as well as the results produced by research. Research and higher education extend across all sectors, and are by nature international with a wide array of stakeholders. At the same time, the major social challenges, such as climate change, are not confined within sectoral boundaries. Scientific disciplines, institutions and authorities must find solutions across traditional patterns of cooperation. The activities to draw up a long-term national plan for research and higher education will serve as an arena in which the research and higher education sector, trade and industry, and the users of research may engage in an open discussion of how to prioritise resources. More transparency regarding these priorities will lead to greater predictability for actors within the sector. The Ministry of Education and Research will establish a system that allows all the key players to make their priorities known. The Research Council of Norway, the Government's most important research policy adviser, will play a central role in drawing up the plan.

² Excluding revenues from petroleum activity and international shipping.

3 Knowledge provides opportunity

To achieve Norway's research policy objectives, it is crucial to have an effective, reciprocal flow of knowledge both nationally and internationally between society at large, trade and industry, and stakeholders in the research system. Effective cooperation between research, higher education and innovation communities is vital as well. The generally high level of education in Norway means that the labour force is willing and able to participate in restructuring, and Norway has more employee-driven innovation than countries with a stricter hierarchical structure. These characteristics of the Norwegian model lay a foundation for cooperation and knowledge flow as important Norwegian competitive advantages. Thus, policy that facilitates this flow and that helps to integrate international cooperation more closely into it will be high on the agenda in the upcoming period.

Effective interaction must derive from sound research ethics. The Government seeks to enhance cooperation between the system of research ethics committees and the research and educational institutions, and will use Norway's participation in international arenas to promote good research practice. Productive cooperation is also dependent on access to research results. In principle, it is the Government's view that all research that is wholly or partially funded through public allocations must be made openly available. Open access to scientific articles means that readers may read them without restriction on the Internet. The Government will require that all scientific articles that are wholly or partially publicly funded must either be published as open access articles or self-archived as agreed on with the publisher.

The labour market is changing faster than ever. This gives good reason to direct broad attention to new needs for knowledge and expertise, and the Government wishes to stress the important role

that educational quality plays in society's ability to adapt and innovate. To support the co-action between what educational institutions have to offer and society's need for appropriate, high-level expertise, the Government will establish a system for analysing future competency needs. The Government will also examine the possibility of establishing a scheme for public enterprises similar to the Industrial Ph.D. Scheme. In addition, 10 years have passed since the Quality Reform in higher education was introduced.³ One of the primary objectives of the reform was to raise the quality of higher education through closer follow-up of the students. A status report on the evaluation of the reform in 2007 stated that it was too early to measure whether the reform had strengthened quality in higher education and whether the overall objectives had been achieved. The Government therefore plans to carry out an evaluation of parts of the Quality Reform related to educational quality.

Research and higher education, together with better utilisation of the labour force through expertise and use of technology, will remain key factors in the Government's efforts to promote more value creation in and the restructuring of the Norwegian economy. The Government will continue to give priority to a broad spectrum of instruments, including open research and innovation instruments as well as thematic initiatives in areas where Norway has strategic advantages, such as marine research. Similarly, research and higher education play a central role in the development of the public sector. The Government will expand the framework for effective cooperation between educational and research environments and the public sector throughout the country, and expects the Research Council of Norway to expand its efforts to promote innovation in the public sector. The health and care services, along with climate change, are fields in which research-based knowledge is crucial to future development. The Government will strengthen research and development as an instrument in the health and care services, and give priority to

³ http://www.regjeringen.no/nb/dep/kd/dok/veiledninger_brosjyrer/2001/do-your-duty—demand-your-rights.html?id=419318

research on climate change on society, climate measures and the transition to a low-emissions society.

The core of research and higher education activities revolves around people. To promote knowledge development and knowledge sharing, the Government will seek to expand the framework for mobility of research and development personnel between institutions, sectors and countries. The Government also emphasises how crucial it is for universities and university colleges to have an institutional, strategy-based, transparent personnel policy to help make their institutions attractive as workplaces. The Government will make a concerted effort to follow-up measures designed to reduce the proportion of employees on temporary contracts, in part through targeted follow-up of institutions exhibiting inadequate results. Financial instruments may be used to address this. To strengthen recruitment of especially talented researchers in mathematics and natural sciences, technology, medicine and dentistry, the Government will establish a trial scheme for tenure-track positions with a quota of up to 300 positions.

Differentiation and profiling of activities at universities and university colleges are an important means of achieving the objectives of higher quality and greater impact for Norwegian research and higher education. Together, profiling and specialisation will enhance the diversity of the higher education system. There is a demand in all parts of the country for good access to higher education and specialist knowledge environments. The need for educational programmes and skilled personnel at the regional level is an important argument for quality-promoting specialisation. In the coming four-year period the Government will therefore focus particular attention on advancing the development of internationally leading Norwegian educational and research institutions that score highly in international evaluations, and on intensifying the national effort to strengthen expertise and research in the professional disciplines. Norway needs financial instruments that adequately support quality development through profiled universities and university colleges, promote effective task distribution, ensure sound scientific concentration and encourage each institution to focus on its own specific advantages. Thus the Ministry of Education and Research will assess the structure of its overall

funding to universities and university colleges, including the balance between the direct allocations and external research funding through the EU and the Research Council of Norway.

In connection with the preparation of this report, updated information was compiled about the role of the independent research institutes in Norway. On the basis of this information, it has been decided that no major changes will be made to Norwegian policy relating to these independent institutes. Overall, the independent research institutes fulfil their role and achieve good results. However, the Government will simplify the system for basic funding of independent research institutes.

The Research Council of Norway was evaluated in 2012.⁴ The main conclusion is that the Research Council functions well and enjoys high user confidence. The Research Council of Norway is the Government's most important implementer of national research policy priorities and is the principal instrument for developing the research system as a whole. The organisation must continue to refine its funding instruments and work methods with an eye to enhancing the quality of Norwegian research even further. The Research Council will therefore need work methods, instruments and procedures that can be adapted to different user groups. The Research Council must also strengthen the knowledge base for its advisory activities, expand its strategic efforts to develop the independent research institute sector, promote clearer profiling of universities and university colleges, and help to set clearer priorities in international research cooperation.

⁴ [http://www.regjeringen.no/upload/KD/Vedlegg/Forskning/rapporter/
Evaluation-of-the-Research-Council-of-Norway.pdf](http://www.regjeringen.no/upload/KD/Vedlegg/Forskning/rapporter/Evaluation-of-the-Research-Council-of-Norway.pdf)

4 Internationalisation of Norwegian research

It is important to maintain close contact with international environments in order to make the most of this knowledge and to contribute Norwegian expertise. To further enhance the quality of Norwegian research and higher education, international cooperation must become an integral part of the average workday of more Norwegian researchers.

Global issues related to climate change, the environment, migration, health, poverty, food, water or energy are examples of problems that have a great impact on Norway and that will put the international community to the test. They also serve to illustrate how global knowledge and competence development and Norwegian knowledge policy objectives have grown increasingly coincident. Moreover, interest in research cooperation that in various ways supports other policy objectives – foreign policy, development policy and industrial policy – is on the rise.

Norwegian research must help to generate solutions to global problems in those areas where the country has strong, competitive environments. Climate research is one area in which research environments have contributed significantly to the international community's ability to find better solutions. Norway also has leading environments in the areas of energy, food, health, natural resource management and social science. The petroleum sector plays a critical role in the Norwegian economy. Petroleum activities are global in scope, and it is therefore crucial that Norway has constructive research and development cooperation with the International Energy Agency (IEA) as well as with oil-producing countries such as Brazil and the US.

Svalbard, with its northern location, offers unique accessibility and infrastructure, and thus provides good opportunities for research

related to the Arctic. Norway aims to develop Svalbard as a platform for international research and environmental monitoring.

Participation in the EU framework programmes for research, technological development and demonstration activities is the Government's most important instrument for promoting the internationalisation of Norwegian research, both for strengthening Norwegian competitiveness and for gaining access to a large international knowledge base. Cooperation with Europe is essential, regardless of the form of association that Norway chooses in relation to the new EU framework programme for research and innovation, Horizon 2020. The Government will therefore draw up a strategy for Norwegian research cooperation with the EU that identifies clear priorities for cooperation.

Cooperation with countries outside of the EU and North America is increasing. This reflects in part the growing importance of countries such as Brazil, China, India, Russia, and others in global research, and in part the formal and informal research agreements and networks established between government authorities and research institutions in these countries. The Government will follow up research cooperation more closely with countries with which Norway already has signed bilateral agreements, as opposed to entering into new agreements. This does not rule out the possibility of developing cooperation with other countries when this is of special interest with regard to knowledge, industrial or foreign policy.

International cooperation is gaining in importance within the Research Council's programmes and activities. Participation in European research cooperation and bilateral cooperation are being integrated into the national initiative on research and innovation. Norwegian research and higher education institutions also have extensive cooperation with institutions in other countries. This cooperation is often set out in separate agreements and may apply to cooperation within higher education, research or both.

Norwegian higher education is also becoming increasingly international. The number of international students at Norwegian educational institutions has risen by 67 per cent from 2004 to 2011. The majority come from European countries; close to 59 per cent in 2011. The highest number of European students to Norway come from Ger-

many, Russia, and Sweden. After Europe comes Asia, representing about 22 per cent of the total number of international students. From the Asian countries, the greatest number of students come from China. The number of Norwegian students studying abroad is larger than the number of foreign students coming to Norway. The majority of Norwegian graduate students abroad, more than three-fourths, study in a European country. The most popular countries in which to study are Denmark, Poland and the UK. Outside of Europe, Australia and the US are the most popular. Very few graduate students from Norway study in non-English speaking countries outside of Europe.

The schemes under the Norwegian State Educational Loan Fund are important tools for encouraging Norwegian students to expand their choice of countries in which to study. The Fund provides support for up to one semester of training in language and social studies in countries where students plan to study at higher educational institutions, as well as language grants for shorter language courses prior to studying abroad.

International joint degree programmes are also an important internationalisation measure that enhance the quality and relevance of higher education and help to link together international research cooperation and higher education cooperation. Joint degree programmes entail benefits in many areas; they enhance academic and organisational development at the institutional level and promote systematic, reciprocal student and staff mobility. A positive trend has been noted in the number of joint degrees at Norwegian universities and university colleges.

5 Norway as a research nation⁵

A total of NOK 45.5 billion was invested in R&D activity carried out in Norway in 2011, and just under 65 000 individuals were defined as R&D personnel. This encompasses people who work in many different organisations and within a variety of sectors and industries, private and public alike. This white paper employs a broad definition of R&D. The various sectors, industries and subject areas have their own work methods, timeframes and needs. Thus R&D activity in its myriad of forms has many different objectives and motivations. Each of the ministries is responsible for knowledge development for and within its own sector. The state provides support for a comprehensive higher education and research system through a diverse range of instruments, institutions and activities spread throughout the entire country.

About 27 per cent of all R&D activity in Norway is conducted at universities and university colleges. This consists mainly of long-term, basic knowledge development whose focus is determined by the institutions and research groups themselves. Roughly six per cent of R&D is conducted by the hospital trusts, and the main purpose of this is to improve the services. Some 23 per cent of R&D is carried out at independent research institutes. These institutes receive basic funding from the state, but serve markets and develop knowledge for use in both the business and the public sectors. The business sector accounts for about 44 per cent of R&D performed in Norway. This is R&D designed to improve the companies' products and services.

In addition to allocations to universities, university colleges and independent research institutes, the government supports the devel-

⁵ For more information, see Report on Science & Technology Indicators for Norway: http://www.forskningradet.no/prognett-indikatorrapporten/Science_And_Technology_2011/1253969847714

opment and application of knowledge through many different instruments such as loans, tax incentives, grants through research and technology programmes, funding for commercialisation of research results and new business start-ups, network building, infrastructure and industrial parks, etc.

Some of the instruments are open to all thematic areas and are intended to provide support for researchers and companies seeking to pursue their own ideas. Others are targeted towards the advancement of scientific fields, major social challenges or the development of technologies, sectors or enterprises. Almost one-third of public allocations to R&D are channelled through the Research Council, which plays a vital role as implementer of national research policy.

Report No. 30 (2008–2009) to the Storting, *Climate for Research*, emphasised that Norway scores disproportionately low in international comparisons related to GDP targets due to its particular industrial structure and the prominence of the petroleum sector. To obtain a more nuanced picture of research investments, it is important to use additional indicators that view R&D investments in relation to population figures or mainland GDP and that look at the number of R&D work-years in relation to the number of employees.

Norway is one of the international leaders in the allocation of government funding to R&D. In fixed 2013-NOK the allocations to R&D activity over the national budget increased from 20.7 billion in 2005 to 27.4 billion in 2013. The proportion of the national budget allocated to R&D also rose during this period: from 3.4 per cent of the total budget in 2005 to 3.7 per cent in 2013.

Of the 34 OECD member countries, only one allocates more government funding per capita to R&D than Norway. If the countries are ranked according to R&D expenditures per capita financed by industry, Norway comes out at number 15. Overall, Norway is ranked number 13 in the OECD area according to total R&D expenditures per capita. Norway is ranked number 10 among the OECD member countries with regard to the number of R&D personnel (researchers and technicians and other supporting staff), with 14 R&D work-years per 1 000 employees in 2011.

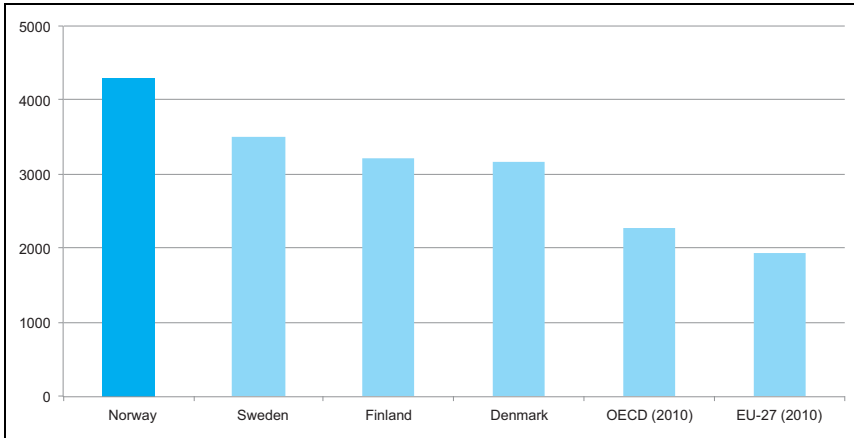


Figure 5.1 Gross domestic expenditure on R&D financed by government per capita, 2011 or latest available year, in NOK (adjusted for purchasing power parity)

Source: OECD: Main Science and Technology Indicators 2012:2 and the Nordic Institute for Studies in Innovation, Research and Education (NIFU)/Statistics Norway: R&D statistics

Total R&D expenditure as a share of mainland GDP was 2.18 per cent in 2011. This is an increase from 2.03 per cent in 2005. Government allocations to R&D over the national budget were 1.11 per cent of mainland GDP in 2013.

The Government has introduced a one per cent target, i.e. that public research allocations are to comprise approximately one per cent of GDP. In 2005 the allocations to R&D activity over the national budget were 0.79 per cent of GDP. Due to an average annual real growth in R&D allocations of 3.5 per cent from 2005 to 2013, this figure has risen to 0.92 per cent in 2013. This increase has occurred simultaneously with a dramatic rise in Norwegian GDP.

The Government's long-term objective is the three per cent target, i.e. that overall research investments will comprise three per cent of GDP. In 2011 the total R&D expenditure was 1.66 of GDP. The corresponding figure for 2005 was 1.51 per cent.

Looking at public funding alone, no other country spends more money on education than Norway. Norway allocates nearly USD 13 400 per pupil or student annually for the entire educational cycle, which places the country 80 per cent above the average for the OECD member countries with regard to public funding. For expenditure on higher education, Norway allocates the most public resources per student. If private expenditure is included as well, Norway ranks number 5 in expenditures per student. The reason for the large resource use in Norway is primarily that no other country has a higher teacher-student ratio in higher education than Norway.

Enrolment capacity will be expanded through the creation of a total of approximately 23 400 new study places in the period from 2009 to 2017. About two-thirds of these will be allocated to mathematics, natural science and technology, health and social care sciences, and teacher education and early childhood education and care teacher education. The institutions will allocate the remaining study spaces in keeping with their own strategies and regional needs. In addition to addressing the growth in the adolescent-level classes, the Government has maintained the practice of offering free tuition, including for international students, while many European countries are tightening their public budgets.

In spite of the positive trend, Norway diverges from the other Nordic countries in that it has a lower proportion of doctoral candidates in the natural sciences, technology and engineering. In 2010, 18 per cent of all Norwegian doctoral candidates completed degrees in these subjects, while the corresponding figure for Finland was 36 per cent, Sweden 26 per cent and Denmark 21 per cent. Norway has a relatively high proportion of doctoral candidates in the social sciences, education, health and welfare fields.

The number of completed doctoral degrees per year has more than doubled from 2000 to 2012. In 2012, 1 461 doctoral degrees were completed in Norway, which is 10 per cent higher than in 2011. Almost the entire increase is due to the completion of more doctoral degrees at the University of Oslo and the Norwegian University of Science and Technology. The percentage of foreign students among the

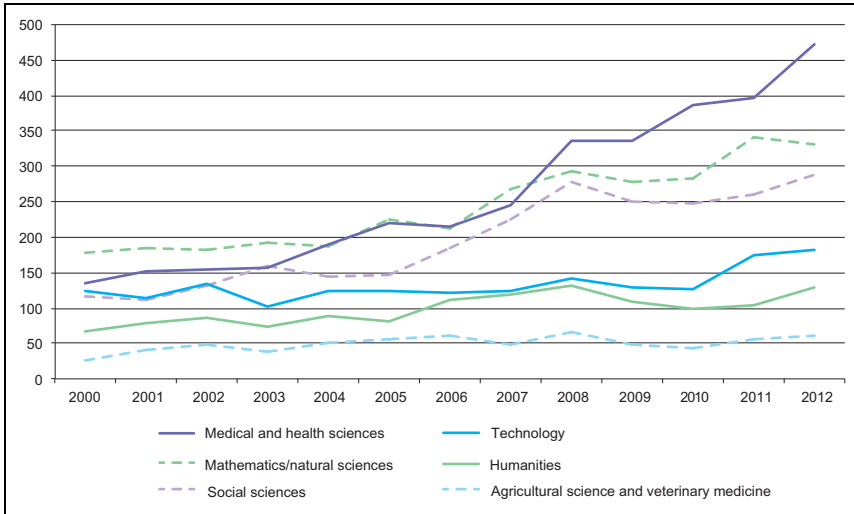


Figure 5.2 Number of completed doctoral degrees in Norway by academic discipline, 2000–2011

Source: Nordic Institute for Studies in Innovation, Research and Education (NIFU)/Doctoral Degree Register

doctoral candidates has risen to 35 per cent. For the first time, the number of women who completed a doctoral degree was equal to the number of men. The distribution among academic disciplines has changed substantially as well. While doctoral degrees in medicine and health sciences comprised 21 per cent of the degrees in 2000, they accounted for 30 per cent in 2011. There has also been significant growth in the number of completed degrees in the social sciences and mathematics/the natural sciences.

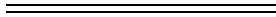
6 Key measures

In addition to a long-term national plan, the white paper Long-term perspectives – knowledge provides opportunity (Meld. St. 18 (2012–2013)) proposes that priority is given to:

- increasing allocations to research;
- assessing whether the overall funding of universities and university colleges is suitable for fostering high quality in research and education and encouraging institutions to focus on fields in which they have special advantages;
- drawing up a strategy for research cooperation with Europe to ensure the stipulation of clear objectives and priorities;
- consolidating the cooperation within existing bilateral research agreements with priority countries outside of Europe, rather than expanding the number of such agreements;
- introducing a trial scheme for tenure-track positions for especially talented, younger researchers in mathematics and natural sciences, technology, medicine and dentistry;
- drawing up a plan to reduce the number of temporary positions and, when needed, require institutions to prepare action plans to encourage this;
- introducing a donation matching scheme to provide a stronger incentive for institutions that conduct basic research to obtain donations from the private sector;
- assessing the possibility of introducing a scheme to increase the number of doctoral degrees in public institutions similar to the existing Industrial Ph.D. Scheme;
- promoting the establishment of infrastructure and support systems for research and development in municipal and county services;
- developing an overall system for analysing and conveying industry's need for knowledge in order to create a better foundation for

targeted educational programmes and to make informed educational choices;

- encouraging a greater flow of knowledge and increased openness: Ensure that research results are made available and disseminated in language that allows users to apply the knowledge;
- put more focus on linking research and education, in part through student involvement in research. The Government is also asking the institutions to consider giving a financial reward to academic personnel who assume responsibility for education and work to develop quality indicators for educational activity.



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